



NYASALAND PROTECTORATE

Annual Report
of the
Department of Agriculture
1925

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PRINTED AND PUBLISHED BY THE GOVERNMENT PRINTER,
ZOMBA



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STAFF LIST

Agricultural

Director	E. J. WORTLEY, O.B.E.
Assistant Director	E. W. DAVY.
Agricultural Chemist	A. J. W. HORNBY, B.Sc., A.I.C.
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District Agricultural Officer	N. D. CLEGG.

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Chief Veterinary Officer	J. A. GRIFFITHS, F.R.C.V.S., F.Z.S.
Veterinary Bacteriologist	J. DE MEZA, M.R.C.V.S.
Veterinary Officer	J. M. CULHANE, M.R.C.V.S.
Veterinary Officer	S. ANDERSON, M.R.C.V.S.
Stock Inspector	E. C. HOLT.

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Forest Officer	J. E. C. CARVER, M.A. (Oxon.).
Forest Officer	R. G. R. TOWNSEND, B.A. (Oxon.).
Forest Officer	P. TOPHAM, B.A. (Cantab.).
Forester	C. G. SEARLE.

Report of the Director of Agriculture

I have the honour to submit my report for the year ended 31st December, 1925.

EUROPEAN AGRICULTURE

A detailed summary of the returns sent in by European planters, in compliance with the terms of the Agriculture Statistics Ordinance of 1917, is given in Annexure E, and the general trend of European agriculture in the Protectorate during recent years is shown by the comparative statement that follows of the acreages of the more important crops under cultivation in 1915, 1924, and 1925.

CROP	1915	1924	1925
	Acres	Acres	Acres
Coffee	1,331	424	875
Cotton	29,578	26,120	17,541
Fibres	420	5,902	4,813
Rubber	6,766	1,795	1,203
Tea	4,141	5,093	5,435
Tobacco	7,484	20,590	22,415
Miscellaneous	1,488	8,344	11,073
Total	<u>51,208</u>	<u>63,268</u>	<u>63,355</u>

The Customs values of the European and Native agricultural products exported annually have only an indirect relation to the acreages under cultivation in the same year, but the returns are of interest and are summarized below:—

PRODUCT	1915	1924	1925
	£	£	£
Coffee	2,651	1,768	768
Cotton	68,586	120,564	96,245
Fibres	2,501	18,015	19,388
Rubber	3,801	6,647	8,541
Tea	8,585	57,046	64,242
Tobacco	92,657	352,348	345,872
Miscellaneous	4,654	4,020	3,578
Total	<u>183,435</u>	<u>560,408</u>	<u>538,634</u>

Tobacco.—Excessive rain and lack of sunshine during the growing season resulted in a smaller tobacco crop in 1925 than in 1924, although there was an increase in the acreage under cultivation. In 1924 the acreage was 20,590 and the yield 65,283 cwts.; in 1925, 22,415 acres were under cultivation and the yield was 47,866 cwts.

Tobacco, however, maintains its position as the most important crop of the country, and the Customs valuations reveal the fact that the value of tobacco exported in 1925 (including the European and native crops) amounted to £345,872, or approximately twice the value of the cotton, tea and fibre exported added together.

During the year tobacco planters received the welcome news that the Imperial Preference had been increased from 1s 4d. to 2s. per lb. The manufacturer, the retailer and the consumer get a share of the preference, but the Nyasaland growers also benefit materially, and it is to its tobacco crop more than to any other single crop that the country must look for an expansion of its agricultural wealth. It is therefore pleasing to note that market reports indicate greater satisfaction with, and an increasing demand for, Nyasaland tobaccos—facts that have been reflected in the keener competition among local buyers.

In the annual report of the Department for 1924, the Acting Director, Mr. E. W. Davy, quoting from the report of Mr. Taylor, drew attention to the essential points of tobacco culture that require attention to further strengthen the reputation of Nyasaland tobacco on the home market.

Results during the past season again indicate the benefits to be derived from the use of carefully selected home grown seed, and more attention could with advantage be given to this matter by tobacco planters.

The increasing popularity of Hickory Pryor, which was introduced on the recommendation of Mr. Taylor, is noted with interest.

Cotton.—The greatest set back in 1925 was the reduction of the area under European cotton cultivation, which fell from 26,120 acres in 1924 to 17,541 acres in 1925.

The crop was seriously devastated by the bollworm early in the season, and in many fields the first crop was negligible. Fortunately, the second crop, especially on the Lower River, proved to be abnormally good, and the yield per acre for the whole country eventually proved to be 64.5 lbs. of lint as compared with 66.1 lbs. in 1924; in the Chikwawa and Lower Shire districts the yield was 83.5 lbs.

In November the Government Entomologist visited the North Nyasa district and the Rungwe district of Tanganyika Territory and found that the pink bollworm was present in both these areas. As a result Government was forced, in the interests of the cotton industry of the rest of the Protectorate, to prohibit the growing of cotton in the North Nyasa district, as well as in a broad belt of land to the south of this district.

Measures are being taken to encourage the growth of tobacco in the North Nyasa district in the hope that this crop will eventually replace cotton.

Flood rains at planting time; an unusually severe infestation of the red bollworm early in the season; the discovery of the pink bollworm in the north; and a rapid decline in the market prices for cotton have all resulted in the year under review being a discouraging one to European cotton growers.

Tea.—Market prices for tea have been satisfactory and the sound position of the industry has been maintained. There was a slight increase in the acreage under cultivation as compared with last year, and further expansion of the area planted to this crop may be confidently expected. A large estate in Mlanje was purchased by Messrs. J. Lyons and Company during the year, and preliminary planting operations have been started.

Our tea planters have wisely put a proportion of the profits accruing in recent years into improved machinery, while there is evidence of the adoption of better cultural methods. The experimental growth of legumes has been actively taken up for manurial purposes and for the smothering of weeds. The more important legumes under trial are sunn-hemp, tephrosia, mseula and green gram.

Coffee.—Enhanced market prices in recent years have led to an increase in the acreage under coffee but the plantings have for the most part consisted of only small fields, and this crop now plays but an insignificant part in the agriculture of the country compared with the position it held in earlier days.

NATIVE AGRICULTURE

In the year 1925 there was a very marked increase in the growth by natives of cotton and tobacco for export and these native industries have now reached a point at which they represent 63 per cent. and 33 per cent. respectively, of the total production (European and native) of these commodities.

The progress of native production is clearly shown by the following figures:—

YEAR.	PERCENTAGE OF TOTAL PRODUCTION.	
	Cotton.	Tobacco.
1915	11	6
1924	35	14
1925	63	33

Cotton.—Results for the past season were very satisfactory and, although the native cotton crop of 1924 was the largest on record, it was more than doubled by the 1925 crop. Production figures for the past five years are given below as well as the amounts produced in the administrative districts during 1924 and 1925:—

YEAR.	SEED COTTON (TONS).
1920	315
1921	375
1922	387
1923	747
1924	1,369
1925	2,909

PRODUCTION IN ADMINISTRATIVE DISTRICTS 1924 AND 1925.

DISTRICT	1924.	1925.
Lower Shire	732	1,692
Chikwawa	128	454
Central Shire	99	153
Mlanje	83	85
Ncheu	100	99
Liwonde (Upper Shire)	11	62
South Nyasa	101	142
Dedza	12	51
Dowa	6	12
Kota-Kota	—	1
Karonga	97	158
	<u>1,369</u>	<u>2,909</u>

Of the 2,909 tons of seed cotton produced in 1925, the Chikwawa and Lower Shire districts on the lower reaches of the Shire River were responsible for 2,146 tons as compared with 860 in 1924, an increase of 1,286 tons. The other nine districts in which cotton was grown together only showed an increase of 354 tons. The comparatively small production in districts, other than Chikwawa and Lower Shire, points to the improbability of an appreciable extension in the future of the native cotton industry of the Protectorate.

Under their agreement with Government the British Cotton Growing Association paid the following prices for native grown cotton:—

No. 1 Grade	...	2d. to 2½d. per lb.
" 2 "	...	1½d. to 1¾d. " "
" 3 "	...	1d. " "

The total sum distributed in payment for cotton grown by natives amounted to £59,637 as compared with £24,500 in 1924, and, in addition, considerable sums were disbursed in the country for labour, motor transport, railway freights, etc.

Owing to the fall in the market value of cotton after the prices had been fixed, the association are likely to make a loss on their purchase of last year's native grown cotton.

Acknowledgment is due to Mr. J. A. Lee, local manager of the association, for the manner in which he carried out the terms of the association's contract with Government and for the assistance that he has given to the Department of Agriculture in connection with the distribution of seed for planting purposes.

Tobacco.—Three years ago only a negligible quantity of tobacco was grown by natives for export, except in the native reserves of the Blantyre and East Africa Company. A widespread

and increasing interest is now taken by natives in tobacco growing, and returns supplied to me by buyers show that the following quantities of tobacco were purchased from natives in 1925 :—

DISTRICT	YIELD. TONS.
Cholo	17
Mlanje	218
Blantyre	249
Chiradzulu	278
Zomba	193
Ncheu	11
Dedza	17
Lilongwe	166
Dowa	26
Kota-Kota	2
TOTAL	1,177

The indiscriminate use of land for tobacco growing, the destruction of timber for fuel and the possible partial neglect of food crops are all matters that demand the attention of Government if the native tobacco industry is to progress on sound lines.

Groundnuts.—Over 100 tons of groundnuts grown by natives were exported during the year. Market reports show a decided preference for the groundnuts collected at Sandama and experiments are being conducted to determine whether a strain of special merit was grown in this locality or whether climatic conditions were more favourable.

Food Crops.—It was feared that there might be a serious shortage in the native maize crop, but the danger of famine conditions was averted by the planting of supplementary food crops and eventually it only proved necessary to give a limited amount of assistance in certain districts.

TOBACCO INVESTIGATIONS

While on leave the agricultural chemist spent four and a half months in the United States of America studying the methods of tobacco culture adopted in Virginia and Kentucky. The information and experience gained by Captain Hornby are certain to prove of material benefit to the tobacco growers of Nyasaland, and a full report on the result of his investigations has been published. (Tobacco Culture: price 3s. 6d.)

THE EMPIRE COTTON GROWING CORPORATION

The country continues to be under a debt of gratitude to the corporation for their generous assistance to the cotton industry. During the year under review the staff of the corporation stationed in this country consisted of Mr. Sampson, cotton specialist, Mr. Ducker, assistant cotton specialist, Mr. King, entomologist, Mr. McEwen, second assistant cotton specialist, and Mr. Millar, farm superintendent.

Work at the Makwapala station which was opened in 1923 was continued on the lines originally laid down by Mr. Sampson. The testing of local and foreign varieties and strains of cotton received special attention and sufficient progress has now been made to justify the bulk planting of two American varieties and of a strain of Nyasaland upland selected in 1923. In addition to the experimental work with cotton, trials have been made with various rotation crops.

Sub-stations were opened by the corporation at Liwonde and at Port Herald during the year in order that strains of cotton giving promise at Makwapala might be tested out under different climatic conditions.

Towards the end of the year Mr. Sampson resigned. During the short time that he was in Nyasaland in charge of the corporation's activities, Mr. Sampson organized his special work with skill, was always ready to co-operate with the Department of Agriculture, and took the keenest interest in the development of the country, and it is with a keen sense of loss that I have to record his retirement. Mr. Ducker was appointed by the corporation to succeed Mr. Sampson as cotton specialist.

BRITISH EMPIRE EXHIBITION

Mr. C. Ponsonby in the honorary capacity of Commissioner for Nyasaland again undertook the duties connected with the representation of Nyasaland at Wembley in 1925, and the greatest credit is due to him and to Mr. Claude Metcalfe, assistant commissioner, for the skilful use that they made of the limited funds placed at their disposal for the purposes of the exhibition.

The following awards were made to exhibitors for exhibits forwarded to the exhibition in 1924 :—

Certificates.—Nyasaland Exhibition Committee; Chamber of Agriculture and Commerce; Mlanje Tea Planters' Association.

Diplomas and Medals.—Livingstonia Mission (woodwork); Messrs. Humphrey Brothers (tobacco); Mrs. C. C. Metcalfe (paintings).

AGRICULTURAL SHOW

The Nyasaland Agricultural Show, revived in 1924 after a lapse of ten years, was held in Blantyre on the 9th July, 1925. The number of exhibits was slightly in excess of those in 1924, but neither in quality or number were they worthy of the agriculture of the country.

Now that the agricultural show has been re-established as a regular annual function every effort should be made by the planters to make it an outstanding success.

On the day after the exhibition an agricultural conference was held which was addressed by His Excellency the Governor, Sir Charles Bowring, K.C.M.G., K.B.E., by members of the Department of Agriculture, and by the Government Geologist.

VETERINARY AND FORESTRY DIVISIONS

Reports by the Chief Veterinary Officer and the Chief Forest Officer on the work of their divisions are appended. The reports deal fully with the activities of these divisions during the year and call for no special comment on my part.

STAFF

The following officers were absent on leave during the year:—E. J. Wortley, Director of Agriculture; 1st January to 9th March. J. A. Griffiths, Chief Veterinary Officer; 1st January to 23rd April. J. B. Clements, Chief Forest Officer; 29th March to 16th October. A. J. W. Hornby, agricultural chemist; 3rd April to 31st December. S. Anderson, veterinary officer; 2nd May to 31st December. R. G. R. Townsend, forest officer; 3rd December to 31st December. N. D. Clegg, district agricultural officer; 2nd May to 31st December. C. G. Searle, forester; 1st January to 23rd April.

CONCLUSION

In conclusion, it is with pleasure that I am able to report that progress has been made in all branches of the Department's activities, and I desire to take this opportunity of acknowledging the good work done by the members of the staff during the year under review.

E. J. WORTLEY,
Director of Agriculture.

ZOMBA, 27th July, 1926.

LIST OF ANNEXURES

- "A." Report of Assistant Director
- "B." Report of Government Entomologist
- "C." Report of Veterinary Division
- "D." Report of Forestry Division
- "E." Agricultural Statistics

Report of Assistant Director

Upon the closing of the Namiwawa Farm at the end of 1923 it was hoped that arrangements would be made for securing a small station near Zomba for carrying on tobacco seed improvement and for preliminary testing of new introductions, but for various reasons this has not yet been achieved. The bulk of the land near Zomba is privately owned, and that which would be more or less suitable for the purpose is already densely settled by natives. A small plot of about two acres, adjacent to the office, of very uneven surface and fertility was brought under cultivation in 1924, and could in time have been made of distinct value, although far too small, but this has now been alienated, and the necessity for securing another station is very urgent.

Fortunately a large proportion of the various promising crops grown on the Namiwawa Farm were taken over by the Empire Cotton Growing Corporation, and have since been grown on their experimental station some ten miles from Zomba. As however the function of this station pertains to cotton only, it is essential that its attention to other crops must be restricted to such as will provide economic rotations with the cotton crop, and there is urgent need for a station where the principal work will be in connection with tobacco cultivation, manurial experiments, rotations, seed selection, and variety testing, as this is already the major crop in so far as European agriculture is concerned, and may ere long also become of major importance to natives, apart from their food crops. As such a station requires an adequate water supply, it would also be more suitable for numerous other plants, which if at present of little economic importance, should not be utterly neglected.

In the area adjacent to the office the principal work has been carried out on tobacco, in continued selection of strains of the most favoured variety, "Gold Leaf," and in testing and selecting other varieties that it is hoped will prove more useful under certain conditions. Owing to the small area, and the variety of tobaccos being grown, it has only been possible to sell moderate quantities of "Gold Leaf" to planters, and this has given excellent results wherever used.

Several varieties prove variable in character even when the flower heads have been bagged to prevent cross pollination, and it is therefore advisable to rogue such selections severely over some years to secure greater uniformity. This drastic rogueing in itself precludes the early production of substantial quantities of seed for distribution, and in many cases the number of seed plants is further reduced owing to the elimination of all that show any tendency to disease susceptibility.

In order that susceptibility to disease may not be masked, the sanitary measures, such as disinfection of seed, heavy sterilisation of seed beds, spraying of seed beds, and of the planted crop, which are to be commended when practised by the grower of crop for leaf production, are ignored in the seed selection work, as it is desirable that any susceptible traits should be revealed and eliminated. This was well revealed in the case of seven specially selected plants of "Gold Leaf" which appeared to be ideal in all respects. The seed from each plant was sown separately, under identical conditions. "Damping off" was very prevalent in the seed beds owing to the unusually wet season. Six of the selections showed excellent resistance, whilst one suffered severely, and was discarded. Had the beds been well sterilised and the seedlings been subject to regular spraying, this weakness might not have been noted, the now discarded selection would possibly have been ideal in all other respects, and would have been propagated and distributed with an unknown latent defect. In all some 40 distinct strains and varieties have been grown, of which 25 may be classed as named varieties. The distinctiveness of some of these varieties, obtained from ordinary trade sources, is more in the label than the contents of the package, whilst in other cases many varieties are contained in a package covered by one label. The buyers of such seed are often led astray by clever advertising and naming of mediocre material; what proves unattractive under the name of "76" or "John Brown," sells freely when put on the market as "Gigantic Mammoth" or "Aristocrat." There is little doubt that some six or seven varieties, if kept pure, would suffice for the various soils and districts of Nyasaland, and "Gold Leaf," "Hickory Pryor," "Tennessee Red," "Western," "Burley," "Melton," and "Little Hill," are probably more suitable for perpetuation than any other varieties at present on the market.

Apart from tobacco, about sixty miscellaneous varieties of legumes, cereals, and other economics from various parts of the world were planted. A large percentage of these failed to germinate owing to seed being too old, and of the survivors only a few need comment at present. A bush form of lima bean, received from the Philippine Department of Agriculture promises to be very useful as it crops early and freely in comparison with the climbing races hitherto tried. The "bush" character is not yet fixed. The same defect is found in a "bush" form of the Florida velvet bean, which it is desirable to acclimatise. A climbing form of lima bean received from the Philippines made an exceptionally rampant growth—equal if not superior in bulk to a good crop of velvet bean. It also cropped well some eight months after planting. The seeds are mixed and generally highly coloured, and will require to be tested for phaseolunatin content before their suitability for human food can be affirmed. Another legume of very attractive appearance that grew well in spite of a very wet season, and which may prove a welcome addition to the native food crops is the "adzuki" bean, *Phaseolus angularis*, which was received from China. Its successful acclimatisation will be welcome, as it is an excellent oriental bean, and if success is attained it will be specially interesting, it being extremely rare for plants introduced from the subtropical or temperate parts of North-Eastern Asia to succeed in Nyasaland. From several legumes useful elsewhere for green manuring purposes only one has shown any degree of merit under our conditions. This is *Cassia hirsuta*. It is however doubtful if it will equal either sunn hemp or *Crotalaria striata* as an annual, or *Tephrosia vogelii* and *Cajanus indicus* as a perennial.

Two fruiting plants introduced for trial call for comment. One is *Sechium edule*, a perennial cucurbitaceous plant which promises to be a success and to crop freely when properly attended to. The fruit, which in flavour is not unlike a vegetable marrow, should be welcome to both Europeans

and natives. The other fruit is the Persimmon, an excellent Japanese fruit, which has yet to be proved suitable for a subtropical climate subject to summer rains. It is generally a success in the warm temperate and subtropical areas subject to winter rains. For the benefit of those anxious to introduce new plants of any kind it may be stated that in the majority of instances failure will be recorded in Nyasaland should the plant be a native of any country in which a pronouncedly winter precipitation occurs. There are a few exceptions, but as a rule plants characteristic of South-West Cape Colony, South-West Australia, North-Eastern Asia (China, Japan, etc.), California, Chile, Morocco, Algiers, Egypt, Asia Minor, and the south of Europe, to quote a few areas, will not succeed in Nyasaland.

E. W. DAVY,
Assistant Director.

Report of the Entomologist

I returned from leave in England towards the end of December, 1924, when the early part of the planting season was over. As this report covers the calendar year, only, the latter part of the 1924-25 season and the early part of the 1925-26 season are dealt with, and owing to my absence on cotton inspection in North Nyasa during October and November, little connected field work has been possible.

Legislation.—Under the Plant Pests and Diseases Ordinance, 1924, various proclamations and rulings were made to deal with the discovery of pink bollworm in the North Nyasa District. This is dealt with more fully below.

Agricultural Show.—Exhibition cases of coffee pests and tobacco pests were made up and put on view during the two days of the show, and "coffee pests" formed the subject of the paper delivered to the conference on the second day of the meeting.

Travelling.—Other than the normal travelling, one journey was made up country early in September, but had to be curtailed owing to a breakage of the bicycle, allowing only of visits to Lilongwe and the Ncheu coffee districts. October was spent in investigating the native cotton area of Mwaya-Ipiana at the north end of the lake, in Tanganyika Territory. A second journey was made to Ngara, North Nyasa, in November, and a week was spent at Port Herald in December. These journeys were all made in connection with the subject of pink bollworm.

TOBACCO

Pests.—The life histories of cutworms and some leaf eating caterpillars were worked on, and notes on these and other pests collected. Experiments on the control of eelworm in seedbeds were started on two estates near Zomba. The experiments were devised to test the value of certain chemicals in clearing badly infected seedbeds prior to planting. Unfortunately the quantity of the materials available was small and though a little information was obtained, the work was interrupted by a prolonged investigation in the North Nyasa cotton area, so that final conclusions could not be made. A list of wild plants attacked by eelworm was commenced and will be continued. Up to the present the following common weeds are definitely recorded:—

Plant			Situation	Degree of Infection
Scientific Name	English Name	Native Name		
<i>Bidens pilosa</i> (Compositae)	Spanish Needle	Chisosoché	Old seedbeds	Medium to heavy
? (Compositae)	Species of Thistle		Old seedbeds	Heavy
?	Species of Nettle (fibrous stem; gummy root)		Old seedbeds	Heavy
<i>Celosia trigyna</i> (Amarantaceae)	cf. Bunongwe (white flower)	Tipitipi (Chinyanja) Nchopa (Chinguru)	Banks of streams and old gardens, appar- ently not in the bush	Heavy
		Sonkwe? (giving a relish called "Terere")	Banks of streams and in the bush	

I am indebted to Mr. G. C. McClement of Mikalongwe for information about the last two plants mentioned.

COTTON

In conjunction with Mr. C. B. R. King, cotton entomologist, a supply of pupæ of red bollworm (*Diparopsis castanea* Hmps.) were despatched to the Victoria University, Manchester, where Dr. R. A. Wardle, M.Sc., had arranged to carry out experiments on the chemotropic reactions of this moth to cotton plants. Between April 15th and July 1st 48 pupæ were despatched, and although they arrived in an apparently healthy condition, further information has not been received.

A request from North Nyasa that native grown cotton from the Mwaya-Ipiana plain of Tanganyika Territory might be brought to Ngara to be ginned and exported through Nyasaland, necessitated a month's investigation of this cotton area.

Pink bollworm (*Platyedra gossypiella*. Saunders) was, unfortunately, discovered both in this area and in North Nyasa.

After due consideration it was decided to prohibit the growing of cotton in the North Nyasa district for the future, and to delimit a quarantine area comprising Mombera, West Nyasa, and Kasungu districts and Kota-Kota district lying north of the Bua river, in which cotton growing is prohibited. The current year's crop was allowed to be shipped under restriction, and a system of fumigation of the baled lint was organised and commenced under official supervision. The subject is fully dealt with in two reports, dated November 10th and December 5th. The necessity for these drastic steps appeared unavoidable, and a careful search of the Port Herald cotton area and ginnery, early in December, giving no sign of pink bollworm in that district, strengthened the conviction that the best possible action had been taken. In addition the importation of all cotton

from Portuguese Territory was entirely prohibited, as it was considered that owing to lack of knowledge of the conditions under which cotton is grown in that territory, the cotton industry of Nyasaland was being exposed to an undue risk, if such importations were allowed to continue. As much latitude as possible was given to allow importers to clear stocks already under movement, but no fresh importations were permitted.

In December a large consignment of cotton seed was irregularly imported from the vicinity of Macequece, on the Beira Mashonaland Railway. This consignment, however, was for through transit to Mtengula, and had been fumigated at Beira. It was examined at Limbe and permission given for it to be forwarded. Some difficulty arose in the Port Herald district concerning the question of burning cotton bushes, as the latest published Cotton Rules did not specifically state that bushes had to be burnt. This matter was set right, and correctly worded Cotton Rules were drafted and forwarded for promulgation.

COFFEE

A certain amount of work with this crop was carried out, and "coffee pests" was the subject dealt with at the agricultural show, as already mentioned. Suggestions for the control of thrips and stemborers were tendered on one estate at Ncheu, and some experimental work was carried out near Zomba on spraying coffee scale with a solution prepared from the "Ombwe" or "Mtutu" plant (*Tephrosia vogelii*).

MAIZE

Breeding of the maize stalk borer (*Busseola fusca*. Hmps.) was carried on, but the work had later to be left in native hands with the usual result.

In order to avoid the possibility of heating of maize stored in tanks, finely meshed gauze covers were constructed for the Public Works Department maize tanks in Zomba, so as the tanks could be left open, allowing free circulation of air but preventing the entry of weevils. It is too early to say if this method is successful. There was a considerable demand, by planters, for supplies of carbon bisulphide, and these were met as far as possible. It is gratifying to note that better methods of storing maize are being widely adopted, and it may be said that Nyasaland has at last discarded the ludicrous and barbaric ideas that have held sway over this subject so long. It is suggested that the Agricultural Department should hold stocks of carbon bisulphide for sale to planters in the future, and it is intended to arrange this next year.

COLIN SMEE,
Entomologist.

Report of the Chief Veterinary Officer

STAFF

The veterinary staff of the Protectorate consists of the following in addition to the Chief Veterinary Officer, the veterinary bacteriologist, Mr. J. de Meza, M.R.C.V.S., veterinary officers, Capt. J. M. Culhane, M.R.C.V.S., and Mr. S. Anderson, M.R.C.V.S., and stock inspector, Mr. E. C. Holt: there are also 24 native veterinary field assistants, one native clerk, 14 police constables and 30 dipping tank labourers. The Chief Veterinary Officer was on leave from the beginning of the year up to April 23rd during which period the veterinary bacteriologist acted as Chief Veterinary Officer. Mr. S. Anderson, veterinary officer, proceeded on leave on May 2nd and was on leave during the remainder of the year, spending a portion of the time in post graduate study at the Dublin Veterinary College.

During the year the policy of training African staff to carry out minor operations, post-mortem examination, including the recognition of the post-mortem appearance of diseased tissues, preparation of specimens for microscopic diagnosis, in addition to the recognition of the symptoms of the common contagious diseases, has been continued by field officers and also in the laboratory at headquarters. An African veterinary assistant is in charge of each of the Government controlled dipping tanks and these men are gradually increasing in value as they receive further training and experience. They have been found particularly useful in advising native livestock owners on general hygiene, treatment of calves for nematode worm infection, castration of surplus males and propaganda on the advantage of regular dipping of livestock. In addition to the Chief Veterinary Officer with headquarters at Zomba, one officer was stationed at Blantyre for the southern districts, one officer at Dowa for the central and northern provinces and the stock inspector had charge of the North Nyasa district with his headquarters at Karonga. All these officers are provided with microscopes and the greater part of the work of diagnosis, where microscopic work is necessary and which can be done in the field, is carried out by officers while on tour or on return to their headquarters. The small staff of officers available only allows of most parts of the Protectorate being visited once during the year and then often only if there have been reports of an outbreak of disease. The closest supervision of the livestock has been in the Southern and Zomba Provinces.

In the Central Province and the southern part of the Northern Province the whole of the native owned cattle were examined at least once during the course of the year and this also applies to the North Nyasa district of the Northern Province.

The Chief Veterinary Officer carried out tours in all districts of the Southern, Zomba, and Central Provinces and also one to North Nyasa; he also visited Kota-Kota, Chintechi, Vizara and Nkata Bay, travelling 6,686 miles by road and 590 miles on Lake Nyasa.

CONTROL MEASURES

The main features of the system of control in force are the measures carried out to control movements of animals by the permit system and, in the case of cattle, maintaining definite routes to avoid tsetse fly zones and also to provide dipping facilities along the routes leading from cattle producing areas to the areas of European settlement, in the southern districts, which represents the only available market for cattle and other livestock.

Dipping facilities are gradually being extended by the construction of more and more dipping tanks both by the Government and also by private persons and there are very few cattle now in the Shire Highlands that are not regularly dipped. In the Central Province there are now nine dipping tanks as compared with 45 in the Southern Province, 13 in the Zomba Province and 3 in the Northern Province. The relative import of this distribution is seen by a reference to the table given below:—

		NUMBERS OF CATTLE	VALUE (APPROX.)	NUMBERS OF DIPPING TANKS
Northern Province	...	62,883	£157,207	3
Central Province	...	40,573	121,719	9
Southern Province	...	15,389	76,945	45
Zomba Province	...	9,093	25,465	13

There were 13 dipping tanks under Government supervision and during the year the following animals passed through these:—

Cattle, 152,884; Sheep and Goats, 7,186.

The privately owned dipping tanks provide dipping facilities for 19,700 head of cattle which are dipped every seven days. These dipping tanks are inspected periodically by the veterinary staff and samples of the contents are tested. There were 502 samples of dip tested during the year.

The number of animals passing through the Government quarantine stations at Blantyre and Zomba during the year were:—

	CATTLE	SHEEP AND GOATS
Zomba	397	3,038
Blantyre	836	2,406

DISEASES OF CATTLE

Rinderpest.—There was an extension of the disease southward towards our northern border and by October it was reported in the area immediately to the north of the district opposite North Nyasa. Special police are employed on our northern border to prevent livestock being brought in from Tanganyika and the stock inspector stationed in that area keeps a register of all cattle in the district, births and deaths being recorded, and in this way it is possible to keep a check on illicit

movements of animals, while the frequent inspections of all herds being made by the veterinary staff allow of outbreaks of diseases being detected and dealt with soon after their onset.

Trypanosomiasis.—The spread of tsetse fly continues to take up more and more of the available cattle grazing areas. An extensive outbreak of the disease was dealt with in the Lower Shire and Chikwawa districts but in spite of the slaughtering off of infected animals some estates have continued to lose cattle from this disease and there is little doubt that tsetse must be playing a part in the transmission of the disease although, except in the Chikwawa district and one estate (Muona) in the Lower Shire district, where *Glossina brevipalpis* exists, no specimens of glossinae have been found.

Losses from this disease have occurred in practically every district in the Protectorate and the menace due to extensions of the tsetse fly zones is still a most serious factor in hindering the development of the country.

Treatment by intravenous injections of tartar emetic in normal saline solution have given satisfactory results where the animals treated have been in fair condition when the treatment commenced. The treatment is not of any value if animals are starved or if they are worked hard while undergoing the course of injections in cases which have become emaciated. The treatment with this drug has the advantage of being cheap enough to make the method one of economic value and more especially as it has been found possible to train native Africans to administer the treatment. Doses of 1 gramme of potassium antimonium tartrate in 25cc of normal saline solution, for full grown oxen, given at intervals of three to seven days are found to be effective for dealing with large herds, providing not less than four doses are given. It is essential that animals under treatment should be well fed. In several cases work oxen have been kept at work while undergoing treatment but this is not desirable, except when for economic reasons it is a case of getting urgent work carried through regardless of possible losses.

There have been considerable extensions of the tsetse fly zones in the north of the Central Province and a definite tendency to rapidly spread southward. In the Northern Province there have been a few isolated outbreaks in areas in which *Glossina brevipalpis* has been found and also others in tsetse free areas due to animals that had traversed a tsetse fly zone having been introduced into a herd. In the south of the North Nyasa district and in the valleys of the South Rukuru and Kasitu rivers, although there does not appear to have been any definite extension during the past few years, it is certain that in these areas several thousand head of cattle have been killed off by trypanosomiasis owing to the persistence of the natives in remaining in the infested zones, and, although there has been a general increase of livestock throughout the Protectorate, amounting with cattle to 126 per cent. during the past fifteen years, the Momberas district shows a comparatively small increase in the numbers of cattle. In the Southern Province the outbreaks of this disease which have occurred have been in areas which are either in country at one time known to be infected with tsetse or at least bordering on such country. Many outbreaks in the Lower Shire valley are undoubtedly due to the introduction of infected cattle into clean herds and the spread then of the disease by blood sucking flies other than tsetse. It is difficult to control such a disease when ox transport is essential to the development of these districts as the actual value of cattle and the difficulties of obtaining sufficient native labourers, particularly to act as carriers, makes the use of cattle of economic value, since the disease rarely kills animals off so rapidly that a return is not obtained more than sufficient to repay the cost, apart from the question of no other means being adequate at present to deal with the transport requirements of these districts.

East Coast Fever.—There was an outbreak early in the year at Mlanda Mission in the Central Province and in a native owned herd kept near this mission. There were over 40 deaths but the disease was brought under control by applying dipping at intervals of three days. There were no outbreaks of this disease outside the Northern and Central Provinces.

Piroplasmosis.—Under this heading are included all tick borne diseases other than East Coast Fever (*Theileria parva* infection), they include infections by *Theileria mutans* (chronic anaemia) anaplasmosis (gall sickness) and *Babesia bigemina* (red water).

The number of deaths from these diseases is not usually large and when they occur there are associated conditions which tend to reduce the natural or acquired resistance of the animals to these diseases, such as occur during the period of drought, when no provision for dry season feed is made, exposure to the heavy rains in muddy unroofed enclosures or in inadequately thatched buildings, cattle being overdriven at any season of the year, heavy infestation by wireworms, roundworms or intestinal worm nodules and also liver flukes. It is in badly tended herds that one finds the conglomeration of conditions which tend to encourage the various infections that so reduce the resistance of the animals that they succumb to the combined attack. The most insidious of the tick borne diseases of cattle in the region around Lake Nyasa is that caused by the parasite known as *Theileria mutans* which is indistinguishable on microscopic appearance from *Theileria parva*, the cause of "East Coast Fever," although in both diseases the whilom diagnostic Kock's bodies of East Coast Fever may be found. The main difference in these diseases so far as Nyasaland is concerned is that *T. mutans* causes a chronic wasting condition of young animals which is not accompanied usually by a very high death rate but which has the effect of stunting the animal's growth, it is a disease which flourishes on poor pastures and particularly during the dry season, thus differing from true "East Coast Fever," caused by *Theileria parva*, which is an acute condition, even in the areas where the disease is enzootic. *Theileria parva* (the East Coast Fever parasite) affects animals of all ages in non-enzootic areas but in Momberas' and North Nyasa districts, where the disease usually is seen in calves or young animals up to 18 months of age, the disease appears to have a rapid febrile course without any anaemia and calves which have passed through an attack appear to quickly regain condition, in marked contrast to the chronic wasting anaemia which is so persistent in animals infected with *Theileria mutans*.

Gall Sickness or Anaplasmosis.—This disease is also fairly generally met with throughout the Protectorate but as in the majority of the other tick borne diseases is easily controlled by dipping regularly at intervals of seven days in the standard strength of solutions of sodium arsenite, providing the animals are being adequately fed, the latter being really of even greater relative importance than the dipping process. It is of interest in connection with the above remarks that of nine bulls and heifers imported from England and six bulls and heifers from India, during the past seven years, by

Government, no one of these has died of any of the indigenous tick borne diseases, even though only the precautions suggested, regarding feeding and dipping, have been observed.

Anthrax.—There have been several isolated outbreaks in which, while the total losses are not great, the widespread centres at which these occurred show that this disease does occur in all the southern area and no doubt is a cause of many of the uninvestigated cases of sudden death. The importance of destroying carcasses of suspected cases by burning has been repeatedly emphasised although the carrying out of such a measure is not easy where there is no means of enforcing the regulation, particularly in native areas. Three cases were definitely diagnosed.

Blackquarter.—Two outbreaks were reported in North Nyasa, in which 54 deaths occurred.

Seasonal Gastro-Enteritis of Cattle (Grass Sickness).—Reports have been received from all parts of the Protectorate of the prevalence of this disease during the past season but the death rate has been negligible where the treatment recommended of dosing with potassium permanganate, 15 grains in a pint of saline solution (1 in 20), has been adopted, when the early symptoms of mucus in the faeces is seen. A number of deaths were reported from several centres in the Central Province.

Demodectic Mange and Streptothricosis.—These diseases give very little cause for anxiety in any area where cattle are being regularly dipped, in fact they have become rare conditions in such areas.

In the Central and Northern Provinces, however, cases are met with by veterinary officers, while on tour, fairly frequently.

Distoma Hepatica Infections.—This parasite is more frequently found in the livers of cattle than sheep but is rarely a cause of death. Practically all old work oxen are found with lesions of biliary cirrhosis due to infections by these parasites and quite 50 per cent. of the cattle slaughtered for food have these parasites present in the liver.

Nematode Infections.—*Haemonchus contortus* and *Oesphagostum columbianum* are the most common of the parasites of the intestine and, in spite of propaganda, have been a cause of losses. *Ascaris vitulorum* was very frequently a cause of losses of young calves. It is difficult in spite of constant reiteration of the means available for prevention of parasitic infection to entirely prevent losses but there is no doubt that among European owners of livestock the losses are very much less now that owners are realising that they can prevent and also treat these cases. A large quantity of the worm treatment is supplied annually from the veterinary laboratory to cattle owners and also to the veterinary staff for use in the native areas.

Cystercercus cellulosae was seen in one case in the Zomba abattoir. The condition is apparently rare in the ox.

DISEASES OF SHEEP AND GOATS

Contagious Pleuro-Pneumonia.—This condition is not frequently brought to notice except where an outbreak occurs near one of the Government stations. The condition appears to be frequently associated with cestode infection. In one outbreak in the Zomba district 45 goats were involved and 17 died showing pneumonic lesions and gross infestation by tænia. The mortality ceased when the whole herd was treated for tapeworms.

Stilesia Hepatica Infections.—This condition appears to be still as commonly met with in sheep and goats from all parts of the Protectorate. Dosing with extractum filicis liquidum appears to have a beneficial effect and clears the parasite from the bile ducts of the liver. The disease causes apparently little loss of condition except when infections are very heavy, when a dropsical condition of the abdomen may be present and a loss of condition. The first effect is similar to the early stages of a fluke infection when the animal actually improves in condition as a result of stimulation of the liver function.

Hydatyd Cysts.—These have been frequently met with in sheep and goats in the abdominal cavity.

Sheep Pox and Goat Pox.—No cases came under observation during the year.

Sheep Scab.—No cases were observed.

DISEASES OF SWINE

Swine Fever.—No outbreaks were reported outside the enzootic area.

Parasitic Pneumonia.—A number of cases were observed in which pneumonia occurred as a result of lesions in the lungs due to migratory ascarid larvæ.

Pigs appear to thrive in an extraordinary manner but they cannot be grazed without considerable danger of infection with *Cystercercus cellulosae*, owing to the lack of sanitary facilities for the disposal of tænia infected human excrement on estates and in villages.

DISEASES OF EQUINES

No infectious diseases of horses, mules or donkeys were reported during the year.

DISEASES OF POULTRY

Contagious Epithelioma of Turkeys.—A number of outbreaks occurred.

Fowl Cholera.—This disease has been very prevalent in the Zomba district in turkeys and fowls. Losses have been very heavy except in cases where it was possible to move the apparently healthy birds to new grounds and housing quite away from the infected area.

Spirochoetosis.—This disease occurs in Zomba, the fowl tick *argas persicans* having been identified as a parasite which affects the local fowl houses.

Aspergillosis.—This is a disease which appears to be more prevalent among ducks in the lake areas. It occasionally appears in epizootic form.

Bacterial Diarrhæa.—This is a common disease of fowls, turkeys and ducks, which is amenable to treatment by the administration of salines such as Glauber salts in the drinking water in the early stages of the disease and there appears to be little doubt of the prophylactic value of the administration of permanganate of potash, in the drinking water, to in-contact, not as an intestinal antiseptic per se but on account of the action of the drug in inducing a reaction of the tissues, in all animals, which appears to be of peculiar value in acute conditions of the alimentary tract due to bacterial activity. It is difficult to explain the action of the drug but there

is no doubt from practical applications of this method of prophylaxis that the drug has a definite value.

DISEASES OF DOGS

Piroplasmosis has been quite common, the majority of the cases being of the "splenic type" in which the most prominent symptoms are anæmia with enlargement of the spleen. The biliary type in which jaundice is such a prominent symptom has been rare. The death rate among cases treated has been low.

Rabies and Conditions resembling Rabies.—A number of cases have been under observation. Four cases were definitely diagnosed as being rabid.

Trypanosomiasis.—Two dogs were treated for this disease with Bayer 205 and in each case there was at first a definite improvement in the symptoms and also the general health. In both these animals however there were repeated relapses in the condition which at first responded to treatment with this drug but later the drug appeared to be without effect and although no parasites were present in the peripheral blood the patients gradually declined into a comatose state. The drug appears to have the effect of aggravating the lesions of fatty degeneration in the liver, usually found in untreated cases of trypanosomiasis of dogs.

Distemper.—This disease cannot be said to be a cause of anxiety to dog owners or breeders in Nyasaland. A condition which resembles the eruptive form of the disease occurs in young puppies but the mortality is rarely severe and it is doubtful if the disease is indigenous as when it occurs it is usually among the offspring of recently imported dogs.

Canine Typhus.—This is a disease which occurs sporadically usually in fatal form.

Intestinal Parasites.—These are very common as in all other animals, particularly in puppies.

Parasitic Skin Diseases.—These are not at all common among European owned dogs but sarcoptic mange is quite often seen among the village dogs.

LIVESTOCK INDUSTRIES

Livestock in Nyasaland owing to their relatively small numbers as compared with the dense population of the country barely supply the present local demands for meat, milk and butter or ghee. With a population of 1½ million natives and about 2,000 Europeans and Indians we only have livestock including cattle, sheep and goats, and pigs amounting to half a million, in consequence of the rate of consumption being little less than the normal annual increase.

It is of interest to study the official figures of the numbers of these stock during the past fifteen years, since the advent of the veterinarian:—

	CATTLE	SHEEP	GOATS	PIGS	TOTAL LOCAL VALUE
1910	54,864	17,842	111,873	14,221	£142,705
1915	82,388	30,281	131,422	24,075	237,649
1920	104,307	44,887	151,337	26,155	402,291
1925	124,038	85,675	182,594	47,492	518,586

The tendency during the period 1910-1925 has been for the increases in livestock to be in the areas in which European influence is greatest, viz., in the Southern and Central Provinces, while in what may be considered to be purely native areas the numbers have been but slowly increased.

The Central Province in the past few years has supplied the majority of the cattle, sheep and goats consumed in the Southern Province in addition to their own requirements and yet as the following figures show they have the greatest percentage increase of any other province in the Protectorate.

(a) CATTLE	1910	1915	1920	1925
Northern Province	41,777	57,781	59,537	62,883
Central Province	5,384	12,763	31,689	40,573
Southern Province	6,162	8,907	11,828	15,789
Zomba Province	1,577	2,947	1,933	5,093
(b) SHEEP	1910	1915	1920	1925
Northern Province	7,447	2,575	11,780	12,657
Central Province	6,133	7,568	23,608	45,863
Southern Province	3,252	13,175	3,910	7,214
Zomba Province	1,012	757	5,524	19,939
(c) GOATS	1910	1915	1920	1925
Northern Province	26,317	25,669	20,112	9,321
Central Province	64,080	64,795	94,304	114,716
Southern Province	14,145	20,034	22,272	29,432
Zomba Province	6,737	5,872	14,639	27,225
(d) PIGS	1910	1915	1920	1925
Northern Province	277	2,575	236	559
Central Province	6,171	7,568	8,539	24,023
Southern Province	7,359	13,175	10,639	22,573
Zomba Province	414	757	747	147

There will be undoubtedly a tendency in the future with increased prosperity on account of the production of economic crops by natives and the consequent increase of individual wealth for the standard of living to be raised and this means with Africans, in particular, an increase in the consumption of meat in addition to expenditure on clothing. This tendency has been noticeable for some years in the southern districts where cattle and other domestic stock were not kept by the natives to any extent, and except for a few odd sheep and goats in the southern highlands natives can reasonably be said to have been without livestock even twelve years ago, and this was practically equally true of the Central Angoniland area, now known as the Central Province, so far as cattle were concerned, in 1910.

The marketing of hides and skins offers little inducement to traders as very little business is done owing to the transportation costs and other difficulties of which the railway is not by any means the greatest.

Small amounts of ghee have been marketed locally by traders from the Northern Province, but the methods have been crude and the market being entirely local has been limited.

The Northern Province is cut off from the market of the Southern Province owing to intervening tsetse fly zones, as well as the excessive distance from a market, so that apart from the local demands which are limited in number and in the price obtainable there is no demand for live cattle and in fact local demands for consumption absorbs the natural increases in males in the herds.

Other sources of income are being sought for the utilisation of livestock products but transport difficulties, mainly the high cost, do not allow of profitably trading in hides and skins in any part of Nyasaland, except in the vicinity of the railway.

The production of ghee (pure butter fat) is unlikely to induce any great enthusiasm from natives, such as the Wankonde in North Nyasa, who live to a great extent on milk and milk products and also have their present requirements for payment of hut taxes satisfied from other sources. It may however be possible to encourage the local production of ghee in the Central Province where the numbers of cattle and other livestock are rapidly increasing and natives are more keen on trading in livestock.

The numbers of animals slaughtered for food which were inspected by the veterinary staff, in the townships of Zomba, Limbe and Blantyre were as follows:—Cattle 875; sheep and goats 4,476; pigs 338.

Veterinary Laboratory, Zomba.—The work of the laboratory has been mainly confined to routine laboratory investigations of outbreaks of disease, and the preparation of trypanosome, wireworm, roundworm and "grass sickness" remedies for use by the veterinary staff as well as by the general public. It was not possible to allocate an officer to carry out research work only owing to the inadequate numbers of executive officers and in consequence the veterinary bacteriologist was employed as veterinary officer in charge of the Southern Province with headquarters at Blantyre, the laboratory at Zomba being under the charge of the Chief Veterinary Officer.

During the year 761 laboratory examinations were made of specimens submitted for diagnosis. I have to thank Mr. E. W. Davy, Assistant Director of Agriculture, Mr. A. J. W. Hornby, B.Sc., agricultural chemist and Mr. Colin Smee, M.C., F.E.S., entomologist, as well as the officers of the veterinary staff, for their willing co-operation in the investigations carried out during the year.

The following is a list of bulletins, pamphlets and articles published by officers of the veterinary division.

The common ticks of Nyasaland, Bulletin No. 1 of 1918.

The method of preparing blood smears, pamphlet, 1920.

The tick borne diseases of cattle and their control in Nyasaland, Bulletin, 1925, by J. de Meza, M.R.C.V.S., veterinary bacteriologist.

Silos and silage, a method of preserving cattle fodder for the dry season, Bulletin, 1921.

Livestock "Veterinary notes," *Nyasaland Times*.

Livestock "Rumination," *Nyasaland Times*.

Livestock "Wireworms," *Nyasaland Times*.

Livestock "General management," *Nyasaland Times*.

Livestock "Weedy calves," *Nyasaland Times*.

Inspection of meat, *Nyasaland Times*.

Our Dogs: (1) "Piroplasmosis," *Nyasaland Times*.

Our Dogs: (2) "Worms," *Nyasaland Times*.

Our Dogs: (3) "Canine typhus," *Nyasaland Times*.

The control of rabies in Nyasaland, *Nyasaland Times*.

The theilerioses of cattle in Nyasaland, *Nyasaland Times*.

Parasitic gastro-enteritis of cattle in tropical Africa, *Nyasaland Times*.

Demodectic mange of animals in Nyasaland, *Journal of Comparative Pathology*, 1915.

Dermatitis and demodectic mange of bovines, *Veterinary Record*, 1918.

Sarcoptic mange in the pig, *Veterinary Record*, 1917.

Clinical cases—Dogs, *Veterinary Record*, 1920.

A note on piroplasmosis of the donkey, *Journal of Comparative Pathology*, 1918.

"Grass sickness," a seasonal gastro-enteritis of cattle in the Shire Highlands of Nyasaland, *Journal of Comparative Pathology*, 1924.

Necrotic abomasitis in cattle, *Veterinary Journal*.

Pre-natal nematode infection, *Veterinary Journal*, 1922.

Nematodes as a cause of ophthalmia, *Veterinary Journal*, 1922, by J. A. Griffiths, F.R.C.V.S., F.Z.S., Chief Veterinary Officer.

J. A. GRIFFITHS,

Chief Veterinary Officer.

Report of the Chief Forest Officer.

During the year under review satisfactory progress was made in most branches of the work of the division. In addition to the 23 reserves which have been proclaimed, proposals for four new reserves were under consideration at the end of the year. An important step in forest protection was the establishment of a district service of native foresters. After a course of training, selected natives were posted to districts on probationary appointment and placed under the respective residents. Their duties are mainly to assist in giving effect to the Forest Ordinance; to supervise forest guards, nurserymen, distribution of plants and village planting operations; to measure trees and produce cut under licence, and to disseminate propaganda on the importance of forest conservation.

Nurseries, under control of the Residents, were maintained at nine district stations in addition to the nurseries managed by the department, and over a quarter of a million plants were issued gratis to natives for village planting.

Departmental exploitation was continued for supplying timber for public works, and adequate stocks of seasoned sawn timber are in hand.

Forest revenue continues to increase, the yield from plantations being particularly gratifying.

Afforestation was undertaken in several forest reserves, the total area planted being 150 acres. The value of plantations for supplying data as to the most suitable species to grow under the very varying conditions found in the Protectorate, cannot be overestimated, as only the results obtained from "test" plantations many years old can indicate which species can be planted with confidence on a large scale.

One of the resolutions of the second Empire Forestry Conference, held in 1923, has an important bearing on this matter. The resolution reads:

"In view of the great and increasing drain on the softwood forests of the world, it is incumbent on every part of Empire to conserve and augment its own resources of growing coniferous timber."

This resolution was the outcome of a report submitted to the conference on the softwood resources of the world. The report showed that in Europe and North America (the principal sources of the commercial supplies of softwoods) the annual growth is not keeping pace with the forest depletion, and that there is only about twenty-five years supply in sight. These facts are of significance to this country, for it must be realised that our supplies of Mlanje cypress (the only indigenous softwood of general utility) are very scanty, and that our hardwood forests can only yield a comparatively small supply of building timber, and that only of special rather than of general utility.

FOREST RESERVES

There were 23 forest reserves existing at the end of the year, as follows:—

Southern Province.

NAME OF RESERVE.	DISTRICT.	APPROX. AREA.	YEAR OF PROCLAMATION.
Matandwe ...	Lower Shire ...	125 sq. miles	1924.
Cholo Mountain ...	Cholo ...	24 "	"
Tuchila ...	Mlanje ...	20 "	1925.
Soche ...	Blantyre ...	1½ "	1924.
Ndirande ...	" ...	7 "	1922.
Kanjedza ...	" ...	512 acres	"
Chigamula ...	" ...	1000 "	1925.
Chiradzulu Mountain	Chiradzulu ...	2 sq. miles	1924.

Zomba Province.

NAME OF RESERVE.	DISTRICT.	APPROX. AREA.	YEAR OF PROCLAMATION.
Zomba Mountain ...	Zomba ...	10 sq. miles	1913.
Malosa ...	Zomba & Upper Shire	25 "	1924.
Liwonde ...	Upper Shire ...	100 "	"
Mangoche ...	South Nyasa ...	125 "	"
Namizimu ...	" ...	250 "	"
White Rock ...	" ...	230 acres	"
Pirolongwe ...	" ...	50 sq. miles	"

Central Province.

NAME OF RESERVE.	DISTRICT.	APPROX. AREA.	YEAR OF PROCLAMATION.
Mvai ...	Ncheu ...	30 sq. miles	1924.
Dzonje ...	" ...	18 "	"
Chongoni ...	Dedza ...	116 "	"
Escarpment ...	" ...	35 "	"
Dzalanyama ...	Dedza and Lilongwe...	470 "	1922.
Mchinji ...	Fort Manning ...	50 "	1924.

Northern Province.

NAME OF RESERVE.	DISTRICT.	APPROX. AREA.	YEAR OF PROCLAMATION.
Nchisi ...	Kota Kota ...	30 sq. miles	1924.
Fort Alston ...	Kasungu ...	1140 "	1922.

Total. 2631 sq. miles approx.

The majority of these areas are important watersheds and the primary object of reservation is that of maintaining and improving water-supplies. Some of them contain forest of a slightly better quality than the poor type general to the Protectorate.

EXAMINATION OF NEW TRACTS

Examined and Reported on by the forest officer, southern division

Neno District.—A preliminary examination of the forest areas of this district was made and the data obtained will considerably facilitate the selection of areas for reservation. Although extensive, the forests are generally of a poor type varying from very open thorny scrub in the plains to the much denser msuku type at the higher elevations. The latter only contain a very small percentage of the more valuable timber trees, but are considered of importance from the native standpoint.

Lower Shire District.—A further examination was made in this district and the data obtained justifies consideration as to further forest reservation, especially of hill tracts to the north of the Matandwe Reserve.

Useful data such as distribution of species in forest tracts and along stream banks, was obtained from the reports of the native foresters posted in the Chikwawa, Lower Shire and Chiradzulu districts.

Examined and Reported on by the forest officer, northern division

Tuma Hill.—Dowa District (Approx. 80 sq. miles).—An important watershed lying between the Lilongwe and the Lintipe rivers. The forest is of a varied character generally, but contains patches of a good quality. Many trees typical of the lake shore are curiously persistent on the eastern face of the hill up to an elevation of 800-1000 feet above the lake level. This is believed to be due to the very warm aspect. Mlombwa occurs in patches on the eastern face and is common on the northern side towards the Lilongwe gorge. There is also a quantity of mbawa scattered throughout the area. The upper slopes of the hill are much denuded of forest. Reservation is being considered.

Lake Shore and Neighbouring Foothills.—Dedza, Dowa, and Kota Kota districts.—An extensive examination was made but only a few forest tracts of especial interest were found:—

Tracts of Sanya (*Copaifera mopane*), Dedza District.—These are remarkable for the exceedingly good natural regeneration and for their density; the volume of timber per acre being very considerably greater than that of usual mixed forest.

Borassus Palms (*Borassus flabellifer*) mostly found in Dedza district, partly sporadic but forming large groves in several localities.

Mareli Island, Dowa District.—A group of three small islands which were reputed to be well stocked with Mkongomwa (*Afzelia cuanzensis*). On examination this species was found to be confined to a very small patch, the greater part of the islands being covered with a comparatively valueless *Brachystegia* species (Mseza or Mtwana).

The remainder of the lake shore examined was mainly poor thorny scrub.

Examined and reported on by the acting Chief Forest Officer

Chimaliro Hills.—Kasungu District. (Approx. area 38 sq. miles).—An important watershed at the north of the district in which arises the Lueresi River and most of its subsidiary streams. The forest in the area was found to be of a better quality than the poor type general to the district. Reservation is being considered.

NOTES ON FOREST TYPES BY MR TOPHAM

Much time was spent in endeavouring to ascertain the various associations of trees which go to form the different types of forest. With this in view over sixty plots of an acre each were selected and the numbers and species of trees counted.

These plots were taken partly near Mangoche and partly along the Dedza, Dowa, Kota Kota escarpment and lake shore.

The results indicate the following types, but this is by no means exhaustive of the types of open dry forest in the division.

LAKE SHORE TYPES

Ivory Nut Palms (*Hyphaene crinata*).—These are to be found either in pure groves or singly.

Borassus Palms (*Borassus flabellifer*).—These though found singly are typically to be found in pure groves.

Sanya (*Copaifera mopane*).—Pure forests of this species occur in limited localities, especially in the Dedza district. They are greatly superior to the poor types of forest general to the Protectorate, a marked feature being their good regeneration. The only tree usually found in association with Sanya is Mpingo (*Dalbergia melanoxylon*).

Njenjete (or Bwalankanga or Mkalankanga).—A tree generally to be found in patches but is believed to be of little value. Where it is common it is often associated with Chinama, Chimpakasa and Mchizime, but in smaller numbers. This type of forest is very poor and open, the trees being of small size.

There are other lake shore types chiefly of a scrubby nature, few trees of value being found except Mtondo (*Cordyla africanum*), Msikidzi (*Trichilia emetica*) and sometimes Chisiyo (*Acacia benthami*). Among the other species forming this type are Chilusa (*Odina Wodier*), Chinama, Chiumba, Mpingo and Mtumbu (*Ekebergia buchananii*).

Msangu (*Prosopis kirkii*) frequently forms open park-like savannah forest but it also mixes with ivory nut palms or thorn scrub. It is typically a large tree.

HILL TYPES

Tsamba or Msumbuti (*Brachystegia* sp.).—On high hills and exposed places this species is frequently found pure. It is generally of rather crooked growth and small size but it improves in sheltered localities; 100 to 300 trees per acre is typical.

It is also to be found in other types of forest at lower elevations, e.g., in Mombo or Mchenga forest, there often being 20 to 30 Tsamba trees per acre.

Msuku (*Uapaca kirkiana*) is common immediately below the Tsamba type. It is to be found growing pure but generally it is the predominant species in mixed forest. It is not often found much below 3,000 feet.

Mombo and Mchenga (*Brachystegia* spp.) are typically found with Msuku, and Maula (*Parinarium mobola*) is often associated with it.

Mombo (*Brachystegia appendiculata*) often forms almost pure forest below the Msuku type, the two types usually merging at about 3,000 feet elevation. Mchenga, Tsamba, and Nsolo are the most common species found associated with it.

Mpindimbi (*Vitex cienkowskii*) is one of the few valuable timber trees found in this type of forest.

Mchenga (*Brachystegia spicaeformis*).—Although found in other hill types mentioned, this species is frequently found nearly pure, usually below the Mombo type.

Mwanga (*Afrormosia angolensis*), Napini (*Terminalia sericea*) and Mlombwa (*Pterocarpus angolensis*) are associated with the type, Mwanga being the more common species of the three.

Mtwana or Mseza or Mtondo, generally pure or almost pure forest of good growth. A hill and escarpment type rather local in occurrence and generally between 2,000 and 3,000 feet. Usually on stony slopes.

INTERMEDIATE MIXED TYPES (ESCARPMENT)

The escarpment type is the richest in useful timbers of any yet investigated; it is to be expected as a rule from the base of the escarpment to about 2,500 ft. elevation. Where the slope is not steep, the transition from lake shore to hill types is not generally so well marked, and escarpment types may be absent altogether. The following is typical of one acre of good escarpment forest:—

Tombozi ...	15 to 20 trees	Nsolo ...	20 trees
Mchenga ...	10 to 20 „	Mwanga ...	10 „
Mlombwa ...	4 to 10 „	Mpindimbi...	1 „
Napini ...	5 to 8 „	Mombo ...	30 „
Mpando ...	20 „		

also probably a few other hill trees or lake shore trees including Msetanyani.

The escarpment type of forest varies considerably and it is difficult to lay down definite sub-types. The invasion of hill or lake shore trees and the local presence or absence of Mlombwa or Napini are sufficient to change the type completely though it may still be typical intermediate mixed forest.

These types do not altogether keep to their levels especially where there is no sharply defined escarpment. Thus in Kota Kota district hill trees are to be found on the lake flats and in the Tuma Hill area I have found Baobabs and other lake trees at 1,000 feet above lake level.

Napini and other escarpment trees stray both above and below their zone.

NOTES ON THE OCCURENCE OF VARIOUS TIMBER TREES

Mlombwa (*Pterocarpus angolensis*) occurs singly or in small patches. Typically an escarpment tree, it is found also in the upper hills, but rarely on lake level. It is almost invariably to be found where there is Tombozi, and often with Napini.

Msetanyani.—Found generally on the lower part of the escarpment zone. Generally grows in only a narrow belt where it is quite common and of good size.

Napini (*Terminalia sericea*), found throughout the escarpment zone, and where the zone is not well defined. Napini is generally the first escarpment tree met with when ascending. Generally to be seen with Mchenga and often in Mombo forest. Where Mwanga is found, Napini is to be expected.

Mwanga (*Afrormosia angolensis*).—Not actually an escarpment tree but grows at about 2,500 feet, commonly on fairly level ground. It is to be found sometimes in Mombo forest but generally associated with escarpment trees such as Tombozi or Nsolo.

Ntondo (*Cordyla africanum*).—A lake shore tree found singly or in clumps.

Bwemba (*Tamarindus indicus*).—Not common; found in foothills but generally with lake shore trees.

Mpindimbi (*Vitex cienkowskii*).—Typically in Mombo forest but found also with Tsamba and escarpment trees.

Maula (*Parinarium mobola*).—Mombo and Msuku mixture is its typical habitat but also found elsewhere. The species is never found in large numbers.

DEMARCATIION

The boundaries of the following forest reserves were demarcated:—

By the forest officer, southern division.—Tuchila, Chigamula, and Malosa Reserves.

By the forest officer, northern division.—Pirolongwe and Nchisi Reserves; also extra boundary marks were erected at the Mangoche and Mvai Reserves.

Method.—The method of demarcation followed, was as described in last year's report.

SURVEYS

A stock survey of nine small blocks of forest on the Lichenya portion of Mlanje Mountain was carried out by Mr. Townsend with the object of ascertaining the number and sizes of the *Widdringtonia Whytei* (Mlanje cypress) contained in each.

The area of each block was ascertained by means of chain and compass survey; the total area of the nine blocks being 650 acres.

All cypress over three inches diameter (breast height) were measured and recorded, and these totalled 11,125 trees. The table compiled shows the number of trees of each diameter class in the various blocks.

A plane-table survey was made by Mr. Topham of the cypress plantations in the Zomba Mountain forest reserve, at a scale of 12 inches to the mile.

WORKING PLANS

Although a certain amount of timber was extracted and sold from the Mudi plantations, the coupe marked for 1925 was not clear-felled as per plan owing to the small demand for produce. Consequently adjustments in the plan will be necessary.

The preliminary planting plan for the "lake fuel" plantations (South Nyasa district) required revision; the rotation adopted for Eucalyptus species is now seven years and for other species twelve years.

"Annual plans of operations" were submitted by the two divisional officers at the commencement of the financial year and these were in the main carried out as approved.

COMMUNICATIONS AND BUILDINGS

Paths and tracks were hoed and maintained in the Zomba Mountain reserve and on Mlanje Mountain. A new path was made to the Kanjedza reserve and Namame nursery.

A small rest hut was erected at the Lingamadzi nursery, South Nyasa district. A large shed was built at the Bwaila nursery, Zomba, for holding classes of instruction in connection with the native foresters' course.

The house of the forest officer, northern division, at the Bar, Lake Nyasa, was condemned in February, 1925, and has since collapsed. Other quarters have not subsequently been allocated for the use of this officer.

PROTECTION OF FORESTS AND PLANTATIONS

General.—Although at the end of the year there were 23 forest reserves with an approximate total area of 2,631 square miles, much further reservation will be required to safeguard future supplies of poles and fuel for the native population. Reserve areas in this connection will essentially have to be small, numerous, and widely scattered throughout the Protectorate. It is under consideration whether, in the main, reservation and control of small forest areas for village use should not preferably be effected under powers other than those conferred by the Forest Ordinance.

During the year native foresters were trained and posted to districts, and protection work, including control of forest guards, figures largely in their duties. The establishment of guards was also increased to a total of 64.

Altogether there were 268 convictions under the Forest Ordinance these mostly being offences for cutting river-bank and other protected trees on crown land, rather than offences in forest reserves. Several District Residents reported prosecutions under the District Administration (Native) Ordinance, for offences connected with forest destruction, e.g., unauthorized making of new gardens.

Felling on an enormous scale of trees (other than protected species and on land not being forest reserve) to facilitate the collection of processionary caterpillars for food, was reported from several northern districts. The District Residents were asked to try to stop this practice under powers conferred by the District Administration (Native) Ordinance.

Fire.—The new "Grass Fires Prevention Ordinance, 1925," was applied to the Southern Province as from the 1st of August. It had appreciable effect in diminishing the usual reckless and careless use of grass fires and in particular the Zomba district was practically free from uncontrolled spread of fire during the whole of the danger period. Consequently several reserves in the Southern Province either wholly or partially escaped conflagration which in the past has been an annual occurrence due to the spread of fire from outside. Most reserves, as I explained in my last report, cannot be protected from fire by the normal method of isolating by fire breaks.

The following areas were fire-protected by means of hoed and burnt fire belts:—

The natural cypress woods scattered over Mlanje Mountain.

Soche reserve.

All plantations in the Zomba, Blantyre, Mlanje and South Nyasa districts.

These measures were successful in keeping out fire except in the case of a small eucalyptus plantation at White Rock (South Nyasa) which was burnt before the fire belt was completed; the damage consisted mainly in defoliation and the plantation has since recovered. At Chigamula reserve (Blantyre district), although fire belts were made, a fire entered the reserve at a point where it was thought a road was sufficient protection. The Resident, Ncheu, undertook some fire protection of Mbawa by means of co-operating headmen.

The Resident, Dedza, again successfully protected the face of Dedza Mountain after extinguishing several fires.

Animals, Insects, Fungi.—Damage by these agents was inconsiderable. In the Widdringtonia plantations, Zomba Mountain reserve, a few patches of trees continue to succumb to fungus attack (*Armillaria mellea*) but isolation of the affected areas by means of trenches has so far checked any spread of the disease.

The forest officer, northern division, reports:—

A small experimental plot of Cassia (various spp), at the Bar, South Nyasa, was damaged by sheep.

Hippopotami did further damage to young plantations at White Rock.

Grasshoppers again attacked the foliage of Casuarina at the Bar (as last year).

Termites (white ants) attacked several experimental plots of trees in the South Nyasa District.

NATURAL REPRODUCTION

The forest officer, southern division, includes the following note in his report:—

"From observations made in various parts of the division it would appear that Msuku, Maula, Mombo, and Tsamba reproduce very freely from seed, and up to the time of the annual grass fires the ground in the vicinity of these trees is usually well covered with young seedlings."

The forest officer, northern division, reports:—

Lake Shore Forest.—Regeneration is not very common except for a few species. The grass is usually long and burns fiercely in the fires. Regeneration is generally found on stoney slopes where the grass is short and thin.

Hill Forest.—Msuku shows good regeneration under various conditions, not excluding long grass. As reported last year, Tsamba regenerates well even under adverse conditions.

River Banks.—Young Mbawa is occasionally noted and is conspicuous in the Mua (Dedza) and Tuma Hill areas. Mwenya and Ntanga-ntanga regeneration is generally less frequent.

SOWING AND PLANTING (PLANTING SEASON 1924/25)

Zomba.—Nurseries were maintained at Bwaila, Ntonya, and Zomba plateau. Blank spaces in the Ntonya plantations, due to failure of Eucalyptus species, were replanted with *Cassia siamea*. At the arboretum, Bwaila, small plots of the following trees were planted: *Schinus molle*, *Syncarpia laurifolia*, *Frazinus velutina*, *Pongamia glabra*, *Melia azadirachta*, *Cryptomeria japonica*. In the Zomba Mountain reserve 39 acres were planted up with *Widdringtonia Whytei* (Mlanje cypress), *Cupressus lusitanica* and *Cupressus torulosa*. The roads and rides were lined with three rows of either *Grevillea robusta* or *Frazinus velutina*. Experimental plots of the following pines were planted: *Pinus longifolia*, *P. patula*, *P. caribaea*, *P. ponderosa* (varieties *macrophylla* and *arizona*), *P. paluensis*, *P. taeda*, *P. insignis (radiata)*. Trial plots were also planted of *Cupressus Benthami* and *Juniperus bermudiana*.

Plants were raised at all nurseries for distribution and sale.

Blantyre.—The Namame, Kazungu and Mudi nurseries were maintained. In the Kanjedza reserve, Limbe, 63 acres were planted up, and in addition the area planted in 1923/24 was filled in to a spacing of 5 ft. x 5 ft. The plants used were *Cupressus lusitanica*, *Cup. torulosa* and *Widdringtonia Whytei*. Roads and rides were lined with belts consisting of three rows of *Cedrela toona* and similar belts were planted through the middle of compartments as a fire precautionary measure. All the coniferous plants were planted out with balls of the original nursery soil around their roots.

Plants were also raised at the nurseries for distribution and sale.

South Nyasa District.—Nurseries were maintained at White Rock reserve and at Lingamadzi, Namweras.

At White Rock reserve 34 acres were planted out at the end of January with *Eucalyptus saligna*, *Euc. rostrata* and *Euc. tereticornis*. About five acres of this was destroyed by floods during February, but the remainder was saved without much damage by means of constructing surface drains into the lake. Trial plots of *Cedrela toona*, *Cassia siamea*, and *Acacia spp.* were also established, but these have since proved of no great success.

Small trial plots of various species were both sown and planted at the Bar, but these have all been unsuccessful due either to unsuitability to the conditions or to destruction of the seedlings by insects and animals.

Plants were raised for distribution and sale at the nurseries.

Mlanje.—Nurseries were maintained on the Mlanje plateau and at the timber depot, Likabula Valley. On the plateau an area of five acres of cleared forest land was prepared and planted up with *Widdringtonia Whytei*. Blank spaces in previous years plantings were filled in. All the plants raised in the Likabula nursery were for distribution or sale.

Other Districts.—Nurseries were maintained at the following district stations under supervision of the Residents:—Chiradzulu, Port Herald, Dedza, Dowa, Mzimba, Kota Kota and Karonga.

During the year new nurseries were established at Ncheu and Kasungu.

Area of Plantations.—The total area of plantations under the management of the department is now 1,206 acres (approx).

TENDING OPERATIONS

The systematic thinning of plantations continues to receive the close attention which its importance in successful management demands. With the exception of Mlanje plateau, thinnings realized satisfactory prices in all localities.

As cleaning operations are so heavy during the first three years of the life of a plantation and moreover they constitute the greater part of the cost of formation, particular attention is being paid in endeavouring to obtain a 100 per cent. stock of plants on areas at the first planting, as otherwise the expensive "cleaning" period is prolonged.

SEED AND PLANTS

Seed Collection and Purchase.—A considerable quantity of *Widdringtonia Whytei* (Mlanje cypress) seed was collected on the Mlanje plateau. *Cupressus lusitanica* seed was purchased from South Africa and *Cupressus torulosa* seed from India, although small quantities of both species were obtained from local plantations. Small quantities of various other kinds of seed were purchased from South Africa, Southern Rhodesia, India and U.S.A.

Considerable quantities of seed were collected from plantations at Zomba, Blantyre and South Nyasa.

Seed Sales and Issues.—Sales of seed to the public during the financial year 1924/25 totalled 95½ lbs, realizing £61. Free issues of seed to missions, etc., for raising plants for distribution to natives, also free samples to the public, amounted to 19 lbs.

Sale of Plants.—During the financial year 1924/25 71,788 plants were sold to the public, realizing £68.

Free Issue of Plants (Planting Season 1924/25).—To Government departments, 25,699 plants. To natives, 287,396 plants were issued as follows: Zomba nurseries 72,314, Blantyre 7,776, South Nyasa 30,000, Mlanje 24,597, Chiradzulu 40,000, Port Herald 9,233, Dedza 100,000 (estimate), Dowa 3,000 (estimate), Kota-Kota 476.

In Zomba the plants were largely issued to natives cultivating in the Zomba reserve under licence, the arrangement having been made for trees to be planted and tended by the licencees amongst their crops. The issues in South Nyasa were made under a similar scheme for planting in the Namizimu reserve.

With regard to other districts, the following extracts from the Residents' reports are of interest:—

Chiradzulu.—"In addition to the 40,000 plants issued to natives, a small blue gum plantation of about 3,000 trees has been made below the residency, another small plantation of half an acre *Cedrela toona* below the court house, and a former plantation was replanted between rows (approx. three acres)."

Port Herald.—"The 9,233 plants were planted out by 16 villages. In addition about one acre was added to the Malawe plantation last year. The whole plantation covers about four to five acres and two acres are being added this year. The objects of this plantation are (1) experiment, (2) re-afforestation of hillsides and stream-banks, (3) a windbreak for Malawe boma."

An additional nursery has been found necessary as the one at Malawe is not large enough and there is no room to expand. Village headman Mateuzo agreed to have the nursery near his village and to look after it, provided advice and assistance during transplanting were given to him. When I visited the place in March I found that the seed beds had done well and transplanting was well forward. The voluntary acceptance of such work by village headmen is a step in the right direction and deserves every encouragement. Mateuzo has also planted a number of fruit trees. It was possible to provide small money rewards out of presents to chiefs for the three best plantations. Village headman Mateuzo received £1 and two other headmen 10s. each. If possible this practice should continue."

Dedza.—"During the current planting season I have issued over 30,000 seedlings (blue gum and *Cedrela toona*) to natives from the nurseries I started at Dedza; in the Bembeke area alone 116 natives have actually planted out seedlings obtained from me, and they are thriving well. In addition, seedlings planted out at Pemba and Msunduzi are equally flourishing. At Dedza, another nursery of blue gums has been planted out round the new native market, and a number of Mlanje cypress in the boma grounds to replace the present avenues of blue gums when in the course of nature the latter cease to be. Altogether I estimate that over 100,000 seedlings have been planted out."

Dowa.—"A scheme of re-afforestation by natives was commenced in 1923 and nine village eucalyptus plantations were started. These vary in size from half an acre to one and a half acres and are doing well; and in the following year 21 other natives who applied voluntarily were given seedlings which were duly planted. Unfortunately, owing to the lack of first rains, the seedlings in the nursery did not thrive, and very few were sufficiently healthy to give out to natives with the result that the new plantations average only about one-eighth of an acre, the total area of blue gums under native cultivation being about 12 acres. There will, however, be no difficulty in future years of disposing of as many of these seedlings as can be produced at Dowa."

"About four acres have been planted up with *cedrela* trees between the rest house and the Nantombi stream at Dowa. An avenue of Himalayan cypress has been laid out along the road between the station and Misi's village."

Karonga.—"No seedlings have been issued to any natives of this district, as the nursery was commenced only in January last. Two pounds of *Cedrela toona* seeds were received and sown. These grew very successfully, and some 800 plants have been planted about the station."

"About 200 other kinds of trees were also planted."

"It is hoped that a large number of plants will be issued from the nursery to natives next planting season."

RESEARCH

As there is no officer especially employed on research, progress of the work under this heading is slow. Officers when in the field are making technical notes on the following points:—

Natural regeneration of indigenous species and their silvicultural requirements.

The effect of grass fires in this connection.

The raising of indigenous and exotic species under varying conditions and their rate of growth.

Immunity of species from attack by termites and other pests.

A considerable amount of data has been collected and publication will be made when this is more complete.

TRAINING

In 1924 a scheme was put forward to increase the then small establishment of native foresters, the proposals being to provide a forester for each district of the Protectorate in addition to those employed almost solely on departmental afforestation work. The district foresters were to be under the direct control of the respective Residents and were to be responsible for effecting control of forest guards, carrying out forest protection, supervising nursery-work and village planting, controlling cutting, grazing, etc., under licence, and generally attending to all forestry matters in the district.

Early in 1925 this scheme was approved and the help of administrative officers was obtained in recruiting suitable natives as candidates.

A course of instruction was held in Zomba from 5th May to 18th July, and was arranged to include practical instruction and classes on:—

Measuring timber.

Control forest guards.

Essential points in the Forest Ordinance and Rules and also in the provisions of the Grass Fires Ordinance.

General aims and principles of forest policy in the Protectorate, especially those relating to water-supply and provision of fuel, poles, etc., for the people.

Seed collection, nursery-work, planting, tending of plantations, thinning, felling, regeneration by coppice and other means.

A few simple silvicultural principles.

Land selection for village forest areas.

A rudimentary course in map reading.

At first a total of 50 candidates attended the course but unsuitable men were gradually eliminated and at its termination about 30 remained of whom 23 were selected for probationary appointment. An examination, largely of a practical and oral nature, was held in which a proportion of the marks (15 per cent.) was allotted for character. This examination gave a satisfactory result, the order of the candidates being much as was anticipated by observation during the course.

Mr Topham was in charge of the classes, and thanks are due to several officials for their assistance, particularly to the acting Provincial Commissioner, Southern Province, and Dr. Sanderson for their instruction to the class on good behaviour in carrying out their duties, and to Mr. Bithrey for instruction given on matters connected with investigation of forest offences and proper behaviour on duty. By kindness of His Honour the Judge, the High Court interpreter was lent for conducting instruction in the ordinances, the school moving to Blantyre for the purpose.

It is hoped to hold a second course in 1926.

EXPLOITATION

Government Timber Supply.—The usual operations on Mlanje plateau of cutting cypress timber (*Widdringtonia Whytei*) and the transport of the sawn timber to the plains below, were carried out by the department during the year. As there were good stocks of sawn timber in hand, sawing was restricted to the conversion of logs and fallen trees lying in the patches of forest at the Lichenya Valley. The system in force is to clear-fell small patches of forest where the trees are almost entirely overmature, and to replant with the least possible delay. This is the only system possible under the peculiar conditions existing.

The total output of sawn timber was 1,288 cubic feet, and 1,410 cubic feet of the older stocks were transported down the mountain to the Likabula depot, the remaining stock on the mountain at the end of the year being 7,517 cubic feet. There was no change in the cost of operations as previously reported.

During the year 19,675 shingles were adzed from material useful for no other purpose, and 10,020 shingles were transported down the mountain to the timber depot.

Timber, poles and firewood were supplied to the Public Works and other departments from plantations at Zomba, Blantyre and South Nyasa, the material being derived both from areas clear cut under plans, and from thinning operations.

The Public Works and other departments, under their own agency, cut quantities of timber firewood, and bamboos from crown land (other than forest reserve) in various parts of the Protectorate, the Forestry Department exercising as much control as possible.

Supplies to the General Public.—No concessions were granted, all cutting on crown land being carried out under control of licences. River-bank trees sold were mostly fallen or dead trees. A considerable quantity of poles and firewood were sold from plantations. Grazing of cattle, etc., on crown land by non-natives was chiefly under licence involving a fee based on the number of animals grazed.

Minor produce, e.g., bamboos, beeswax and strophanthus seed were collected from forest reserves and crown land but no indigenous rubber (*Landolphia*) was collected during the year.

OUT-TURN OF PRODUCE, APRIL 1st, 1924, TO MARCH 31st, 1925

FOREST PRODUCE SOLD

			QUANTITY
Indigenous timber and poles	...	...	35,580 cubic feet
do firewood	...	...	22,528 cubic yards
do bamboos	...	...	117,600 ...
Plantation poles	...	...	6,240 ...
do firewood	...	...	2,133 cubic yards

FOREST PRODUCE EXEMPTED FROM ROYALTY

Government Departments.—

Indigenous Produce.

			QUANTITY
Mbawa timber (<i>Khaya nyasica</i>)	...	...	4,700 cubic feet
Other species timber	...	...	3,500 cubic feet
Poles	...	...	1,300 ...
Bamboos	...	...	15,000 ...
Firewood	...	...	13,200 cubic yards

Plantation Produce.

Timber (<i>Eucalyptus</i>)	...	...	2,895 cubic feet
Poles (<i>Cypress</i> and <i>Eucalyptus</i>)	...	...	2,152 ...
Firewood (do do)	...	...	461 cubic yards

Free Grant to Natives.—The native population was allowed to take forest produce free of charge and without licence, except within forest reserves, within 30 yards of streams, protected trees on crown land (as provided by the Forests Ordinance).

The produce taken mostly consists of poles, firewood, and bamboos, but as huts, etc., have usually to be renewed every three or four years the amount of produce used is enormous. In addition there is a very great amount of destruction of trees on crown land due to shifting cultivation and to the opening up of new land by immigrants.

FINANCIAL RESULTS

It will be seen that the total revenue increased by £457 over that of the previous year. Sales of plantation produce totalled £580 as compared with £645, £370, £259 and £184, realised respectively in the four previous years. There was a decline both in grazing fees and in sale of plants and seed, the latter being due to planters now being able in many cases to obtain seed from their own plantations, as these begin to produce seed.

ANALYSIS OF FOREST REVENUE COLLECTED DURING FINANCIAL YEAR 1ST APRIL, 1924, TO 31ST MARCH, 1925.

Station.	Indigenous Produce.						Grazing Fees.	Plantation Produce.				Total.			Totals previous years			
	Timber, including poles.		Firewood.		Bamboos.			Timber.		Firewood.					Sale of plants and seed.		1923/24	1922/23
	£	s.	d.	£	s.	d.		£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
Zomba (C. F. O's Office)	413	5	11	475	18	11	66	6	0							2,224	1,354	
Limbe (F. O. S. Division)	171	1	4	438	10	9	7	10	0							Nil	Nil	
Fort Johnston, by Resident	54	5	2	204	9	3	22	16	6							290	329	
Ncheu	226	15	2	20	3	2	16	17	6							68	53	
Port Herald	53	14	4	41	6	9	4	1	3							117	192	
Dowa	45	1	1	29	8	0	2	17	6							73	123	
Lilongwe	51	10	10	16	19	0	0	2	6							33	55	
Dedza	6	10	4	23	7	6	0	5	0							66	80	
Liwonde	31	16	1	8	14	9	10	12	3							23	8	
Kasungu	38	14	0	2	8	0	...									1	Nil	
Fort Manning	16	19	0	13	4	3	...									25	54	
Chintechi	14	14	5	25	7	0	...									21	56	
Chikwawa	22	18	2	11	1	0	0	12	6							14	Nil	
Kota Kota	9	9	2	13	16	0	2	12	6							31	18	
Mlanje	6	8	3	25	0	0	...									33	19	
Chiradzulu	...			29	18	0	...									45	13	
Blantyre	3	13	0	18	8	0	...									54	28	
Neno	...			...			...									4	...	
Cholo	11	13	0	0	12	0	8	0	0							1	Nil	
Mzimba	7	4	5	4	16	0	4	5	0							19	11	
Totals ...	1,185	13	8	1,408	8	4	146	18	9							3,142	2,393	

FINANCIAL STATEMENT (1st April 1924 to 31st March, 1925.)

EXPENDITURE.				RECEIPTS.				
		£	s	d.		£	s	d.
Personal Emoluments	...	2,569	17	7	1. Cash Revenue.			
Travelling expenses	...	305	3	4	Indigenous timber			
Passages	...	337	7	2	(including poles)	...	1,185	18 8
Afforestation	...	703	9	4	Indigenous firewood	...	1,408	8 4
Tools	...	20	3	1	Bamboos	...	146	18 9
Seeds	...	14	0	2	Plantation timber			
Seed bags	...	4	6	0	(including poles)	...	260	1 1
Books	...	3	5	3	Plantation firewood	...	319	18 3
Uniforms	...	3	16	1	Grazing fees	...	149	5 4
Plateau Paths	...	15	0	0	Sale of Plants and Seed	...	128	15 10
Incidentals	...	4	19	10				
		£3,981	7	10			£3,599	1 3
					2. Value of forest produce supplied to Government Departments (exempted from payment)	...	£1,411	0 0
					The royalty value of the estimated native consumption of free forest produce is about	...	£300,000	0 0

ADMINISTRATION

Organization.—There was no alteration in the organization adopted in 1923, the forest divisions remaining as described in the 1923 report.

European Staff.—There was no change in the establishment which consists of Chief Forest Officer, 3 forest officers, 1 forester.

Mr. J. B. Clements, Chief Forest Officer, proceeded on leave on the 29th March, 1925, and returned on the 16th October, 1925. During his absence Mr. J. E. A. Carver acted as Chief Forest Officer.

Mr. R. G. Ross Townsend was in charge of the southern division (headquarters Limbe) until the 3rd December, 1925, when he proceeded on leave. He was relieved by Mr. Carver.

Mr. P. Topham remained in charge of the northern division throughout the year. For several months his headquarters were in Zomba instead of Fort Johnston, during which period he conducted the native foresters' course of instruction.

Mr. C. G. Searle, forester, returned from leave on the 23rd April, 1925, and was stationed at headquarters, Zomba.

Native Staff.—As mentioned previously, the establishments of native foresters and forest guards were increased during the year. The staff at the end of the year consisted of 23 native foresters, 64 forest guards, 3 clerks (1 second grade, 2 fourth grade), 1 messenger.

The native foresters and guards are mostly under the direct control of the District Residents.

LABOUR

At Zomba, Limbe, and Mlanje, difficulty was experienced in obtaining sufficient labour during the planting season. At White Rock Reserve (South Nyasa) the employment of numbers of women and children in planting during suitable weather proved a success. In the Kanjedza reserve the work of cleaning was considerably lightened by allowing natives to make gardens over the area to be planted and also to grow maize between the young trees in the previous years planting. The cash-payment system for timber transport down Mlanje Mountain was continued, but there was a considerable decrease in the amount of labour as compared with the previous year.

GENERAL

Imports of Wood.—Timber imports for the year were valued at £4,481 as compared with £3,087 in 1924, or with an average of £1,386 for the three years 1921 to 1923.

Exports.—No timber was exported. 18,390lbs. of beeswax were exported as compared with 15,664lbs. in 1924 and 11,113lbs. in 1923.

17,723lbs. of strophanthus seed were exported from the Protectorate during the year as compared with 6,488lbs. in 1924. During 1922 and 1923 none of this product was exported.

No royalties are charged either on strophanthus or beeswax.

A few Government leasehold estates were inspected as regards work carried out under the re-afforestation obligation.

Advice on Tree-Planting, Lectures.—Advice was given by the department whenever asked for, either by letter, interview, or whenever possible by personal inspection. Mr. Carver read a paper on "Forestry in relation to private estates" at an agricultural conference held at Blantyre in July.

Propaganda.—This has followed on previous lines:—

Explaining forest regulations.

Explaining the relation between the forests and water-supplies.

Suggesting the principle of village forest areas involving formation of village plantations in certain localities.

The thanks of the department are due to many administrative officers for their help and co-operation in forestry work. In particular should be mentioned Mr. G. F. Philip, Resident, Lower Shire, who in addition to work in raising and distributing plants and inducing the formation of village forest plantations, has supplied much information on the distribution of forest and on other forestry matters in his district.

J. B. CLEMENTS,
Chief Forest Officer.

Name of District.	Total Acreage under cultivation. Acres.	COTTON. (Lint)		TOBACCO.		MAIZE.		TEA.		COFFEE.		RUBBER.				CHILDS.	
		Acres under crop.	Yield cwts.	Acres under crop.	Yield cwts.	Acres under crop.	Yield cwts.	Acres under crop.	Yield cwts.	Acres under crop.	Yield cwts.	Acres under crop.	Yield lbs.	Acres under crop.	Yield lbs.	Acres under crop.	Yield cwts.
Lower Shire	6,896	2,790	2,330	16	73	355	1,720	...	...	...	...	...	...	...	...	...	...
Chikwawa	7,126	6,523	4,616	6	27	555	4,035	...	...	...	...	...	...	...	...	...	...
Central Shire	1,091	...	...	882	2,472	115	780	10	...	30	...	...	...	...	...	...	...
Cholo	13,625	1,539	539	6,945	12,389	447	4,247	567	920	44	24	...	...	...	...	...	...
Mlanje	9,170	1,440	132	2,049	4,391	277	1,680	4,857	9,427	58	14	...	...	...	...	...	...
Blantyre	5,265	85	4	3,078	6,694	317	3,551	...	...	331	233	...	...	...	...	23	11
Chiradzulu	3,304	245	53	1,559	4,078	140	1,300	...	...	4	...	...	...	...	...	...	...
Zomba	5,205	263	61	3,538	8,545	509	5,930	...	...	90	9	...	...	...	...	...	...
Upper Shire	1,035	915	369	85	299	30	300	...	...	...	...	...	...	...	...	...	...
South Nyasa	2,095	68	26	1,827	3,784	36	245	...	...	11	...	...	...	...	...	...	...
Ncheu	2,315	175	35	1,536	3,045	287	1,768	...	...	233	101	...	...	...	...	1	5
Dedza	1,576	930	564	450	919	100	1,700	...	...	8	...	...	...	...	...	...	...
Fort Manning	55	...	...	...	...	7	37	...	...	...	...	...	...	...	...	...	...
Lilongwe	501	10	...	444	1,150	...	...	...	...	...	...	...	...	...	...	...	...
Dowa	621	600	426	...	...	...	...	...	...	1	...	...	...	...	...	...	...
Kota Kota	13	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Kasungu	4	...	...	...	...	4	50	...	...	...	...	...	...	...	...	...	...
Mombera	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
West Nyasa	1,203	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
North Nyasa	2,855	1,958	957	...	...	459	8,710	1	1	5	1	...	...	...	...	...	...
Total	63,355	17,541	10,112	22,415	47,865	3,638	36,004	5,435	10,348	875	382	...	...	1,203	155,925	24	16

EUROPEAN AGRICULTURE, 1925—CONTINUED.

Name of District.	CAPIECUMS.		FIBRES.		BEANS.		GROUNDNUTS.		WHEAT.		FODDER AND FORAGE CROPS.		TIMBER AND FIREWOOD.		ENGLISH POTATOES.		MILLETS.	
	Acres under crop.	Yield cwt.	Acres under crop.	Yield cwt.	Acres under crop.	Yield cwt.	Acres under crop.	Yield cwt.	Acres under crop.	Yield cwt.	Acres under crop.	Yield cwt.	Acres under crop.	Yield cwt.	Acres under crop.	Yield cwt.	Acres under crop.	Yield cwt.
Lower Shire	3,693	8,907	42	190	...	...	...	...	...	...	...	...	...	...	...	...
Chikwawa	33	260	...	...	2	7	...	...	5	2	...	...	...	...
Central Shire	5	...	...	...	1	3	...	...	17	30	1	3	...	...
Cholo	1,113	2,640	454	1,078	6	40	3	5	...	...	1,897	210	...	...	...	...
Mlanje	57	341	3	40	...	...	...	...	269	160	...	...	...	...
Blantyre	19	141	...	...	59	138	8	10	...	...	...	...	1,177	163	5	125	...	...
Chiradzulu	65	323	...	...	...	...	...	...	1,228	63	...	...	...	...
Zomba	7	10	364	1,103	5	36	1	3	...	...	222	206	...	...	...	...
Upper Shire	4	45	1	5	...	...	...	...	...	...	...	...	...	...
South Nyasa	20	24	...	...	3	4	...	...	40	90	...	...	...	...
Ncheu	9	16	...	...	...	...	...	...	7	7	...	...	...	...
Dedza	5	11	10	34	...	...	...	...	45	16	12	300	...	...
Fort Manning	8	30	3	13	6	11	...	...	...	31	...	...	...	...
Lilongwe	10	48	...	...	...	...	...	...	...	37	...	...	...	...
Dowa	2	10	...	...	1	3	...	...	10	7	...	...	...	...
Kofa Kofa	10	3	...	...	...	...
Kasungu
Mombera
West Nyasa
North Nyasu	242	2,004	3	16	160	1,600	...	...	3	24	...	...	...	...
Total	19	141	4,813	11,557	1,379	5,621	39	194	177	1,636	...	...	4,730	1,049	18	428	...	...

NATIVE AGRICULTURE, 1925.

District.	Seed. Cotton.	Rice.	Wheat.	Ground- nuts.	Tobacco.	Maize.	Peas and Beans.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
Lower Shire ...	1,692				—		
Chikwawa ...	454				—		
Central Shire ...	153				—		
Cholo ...	—				17		
Mlanje ...	85				218		
Blantyre ...	—				249		
Chiradzulu ...	—				278		
Zomba ...	—				193		
Upper Shire ...	62				—		
South Nyasa ...	142				—		
Ncheu ...	99				11		
Dedza ...	51				17		
Fort Manning ...	—				—		
Lilongwe ...	—				166		
Dowa ...	12				26		
Kota Kota ...	1				2		
Kasungu ...	—				—		
Mombera ...	—				—		
West Nyasa ...	—				—		
North Nyasa ...	158				—		
Total	2,909		—	—	1,177	—	—

NOTE.—Maize is the staple foodstuff in most districts, but no estimate can be given of quantities grown. Groundnuts, rice, wheat, beans, and various other crops are grown by natives for local consumption, but it is impossible to make any accurate estimate of the quantities. Approximately 100 tons of Groundnuts were exported in 1925.

NATIVE LIVE STOCK, AS AT 31ST DECEMBER, 1925.

District.	Cattle.	Sheep.	Goats.	Pigs.
Lower Shire ...	52	1,250	6,800	8,000
Chikwawa ...	56	886	2,809	5,095
Central Shire ...	520	476	2,437	587
Cholo ...	67	47	732	543
Mlanje ...	15	500	3,500	1,800
Blantyre ...	569	1,540	4,200	2,560
Chiradzulu ...	918	1,164	8,318	3,557
Zomba ...	400	1,100	7,500	—
Upper Shire ...	9	3,329	6,010	15
South Nyasa ...	876	15,182	15,333	2
Ncheu ...	6,802	4,978	26,457	10,761
Dedza ...	5,400	5,000	24,600	1,120
Fort Manning ...	1,181	3,469	3,860	1,321
Lilongwe ...	10,500	14,000	38,000	4,000
Dowa ...	13,671	18,191	21,691	6,368
Kota Kota ...	1,400	1,500	2,000	300
Kasungu ...	3,967	2,459	2,656	—
Mombera ...	27,000	7,200	1,000	180
West Nyasa ...	4,190	548	1,459	—
North Nyasa ...	25,837	850	2,200	—
Total	103,430	83,669	181,562	46,209

LIVE STOCK OWNED BY EUROPEANS AT 31ST DECEMBER, 1925.

District.	Cows and Heifers over 1 year.	Bulls.	Oxen.	Calves.	Pedigree Cattle.	Horses.	Mules.	Donkeys.	Sheep, European.	Sheep, half-bred.	Sheep, native.	Goats.	Pigs.
Lower Shire ...	727	23	322	295	...	...	...	4	...	5	166	117	21
Chikwawa ...	462	13	335	274	...	...	...	21	...	...	193	13	86
Central Shire ...	53	3	61	22	...	...	1	4	...	...	13	10	9
Cholo ...	1,123	39	1,480	462	...	...	4	26	...	195	276	98	197
Mlanje ...	1,025	23	1,041	418	...	...	...	5	...	46	271	193	88
Blantyre ...	1,424	45	1,276	580	...	1	2	42	...	...	127	205	140
Chiradzulu ...	764	17	487	397	1	...	...	20	...	...	59	...	80
Zomba ...	1,182	27	1,564	524	23	1	...	20	...	30	188	91	93
Upper Shire ...	...	...	...	...	...	...	...	...	...	...	27	29	13
South Nyasa ...	248	5	129	106	...	...	...	2	2	...	103	162	24
Ncheu ...	365	17	270	242	...	...	1	8	...	52	41	77	143
Dedza ...	591	21	470	260	...	...	3	55	...	...	99	5	181
Fort Manning ...	162	...	113	4	...	...	...	10	...	...	20	21	26
Lilongwe ...	249	4	123	81	...	...	...	11	...	...	3	4	54
Dowa ...	76	3	29	39	...	1	...	13	...	...	10	1	49
Kofa Kofa ...	54	4	25	21	...	...	...	6	8	...	40	5	...
Kasungu ...	...	...	...	...	...	...	...	2	...	...	1	...	...
Mombera ...	12	2	5	8	...	...	...	2	...	...	...	...	1
West Nyasa ...	12	2	12	2	...	...	...	...	...	...	...	...	...
North Nyasa ...	137	9	122	62	...	...	...	6	...	...	51	1	78
Total ...	8,666	257	7,864	3,797	24	3	11	257	10	328	1,662	1,032	1,283

